

## Transaction Design Standards and Conventions - Introduction

The methods used for enhancement or modernization of current AIS need standardization throughout the application development process. The standards and guidelines contained in this appendix will ensure that each Application Development Team develops screens, menus, error messages, help functions, and use of function keys in a *standard* manner. This will be a benefit to the user in the operation of the production AIS.

The standards proposed in this appendix cover *all* business processes in *all* Corps organizational units. The standards will be reviewed and revised as necessary to ensure compatibility with identified hardware/software. The standards and guidelines have been developed to meet the requirements of identified CEAP-IA environments. The operating environment for these standards will be the CEAP infrastructure, including the ORACLE RDBMS, and the Ada language. The standards also apply to stand alone applications and LAN configurations.

Among the difficult issues of transaction design which must be addressed, is the question of implementation with respect to Graphical User Interfaces (GUI's). More specifically, this is a question of the degree to which applications portability is to be enforced. There are significant differences between designing an AIS to run **under** a GUI, and designing an AIS to run **in** a GUI. An AIS running **under** a GUI has its own initial icon, but once the application is initiated, all control is exercised by the applications code itself, and defaults to the operating system only for I/O operations, until execution is completed. An application running **in** a GUI by contrast, makes direct use of the user interface mechanisms that the GUI provides, such as icons, "radio buttons," "drag and drop," and so forth. Designing an AIS to run **in** a GUI may be more aesthetically

## Appendix 14 - Transaction Design Standards and Conventions

appealing both to the programmer and to the Project Manager, but practical considerations must control the design approach. Applications programmed to run **"in"** a GUI are more sophisticated (i.e., "slick" looking), more difficult and costly to maintain, and less portable. Conversely, GUI-supported **"under"** programmed applications are less sophisticated (i.e., less "pizazz"), are easier to maintain, and are far more portable. So, the question to ask is: How much is the "slick" design worth to the corporation?

There are currently two major GUI standards: 1) WINDOWS 3.X in the PC-DOS world (possibly to be later replaced by either WINDOWS 95 or WINDOWS-NT), and 2) X-WINDOWS in the UNIX world. X-WINDOWS is available in several styles, including MOTIF and OPEN LOOK, as well as lesser, proprietary vendor-sponsored versions. The Defense Information Systems Agency Center for Information Management (DISA-CIM) has authored a "Human Computer Interface Style Guide," Document # AD-A261 280. This guide was designed to allow applications developers to build systems to run **in** X-WINDOWS, using either one of the major styles, and still be portable to other UNIX environments.

The DISA-CIM guide addresses the fundamentals of applications design in a GUI environment. An overview of the GUI subject areas is provided in Table 14-1.

Subject Area	Major Topic	Minor Topics
--------------	-------------	--------------

## Appendix 14 - Transaction Design Standards and Conventions

Screen Design	Initial Screen Design	Workstation log-in, Application log-in/off, Initial workstation screen display.
	Screen Design Guidelines	Consistency, Format, Grouping, Multiple screens.
	Color	Selection, Tonal color coding, Color-coded symbols, Map graphics and color.
Windows	Window Basics	"Dragging," Scroll Bars, Application Area, Message Area, Resizing, Controls, Color/Patterns/Audio.
	Window Design	Control, Designation, Labeling, Navigation.
Menu Design	General	Response Time/Display Rate, Instructions and Error Messages, Explicit Option Display, Stacking Menu Selections, Menu Bars, "Pull Down Menus," "Pop-up Menus."
	Format	Grouping, Ordering, Display Forms
	Hierarchical Menus	Navigating, Depth, and Breadth.
	Item Selection	Menu Usage, Feedback, Pointing
	Menu Option Labeling	General considerations, Selectors
	Dialog Boxes/Pop-up Windows	Message Wording, Work-In-Progress, Information, Caution/Warning Menu.
Object Orientation	Direct Manipulation	Metaphors, Icons.
	Command Icons	Design, Applications
Common Features	Tactical System Common Features	Date/Time, Latitude/Longitude, User Parameter, Wild Card Characters
	On-Line Help	Accessibility, Format, User Control, Options, Applications Return
	Interactive Control	Context, Transaction Selection, Interrupts, Error Management, Alarms
	Function Keys	Consistency, Double-keying, Labeling, Layout

Table 14-1. DISA-CIM GUI Subject Areas

## Appendix 14 - Transaction Design Standards and Conventions

The information provided in the DISA-CIM guide, although oriented to X-WINDOWS/UNIX, and excessive for current applications development directions in the Corps, is extremely thorough and quite valuable. Anyone intending to design an AIS to run **in** a GUI, as opposed to **under** a GUI, would be highly advised to become familiar with this document. Anyone involved in the design of a transaction processing based system, in general, could not help but benefit from some review of this publication.

**For corporate purposes, it is preferable to design for maximum portability, efficiency, and ease of maintenance -- and the design standards that follow reflect this concept.**

### Design Standards

The following areas should be adopted as standards in the development of AIS:

#### Screen Design

A sample screen is provided at Figure 14-1. The screen size will be restricted to 80 columns wide by 22 lines long. This screen size will permit implementation in all anticipated hardware/software/operating system environments.

## Appendix 14 - Transaction Design Standards and Conventions

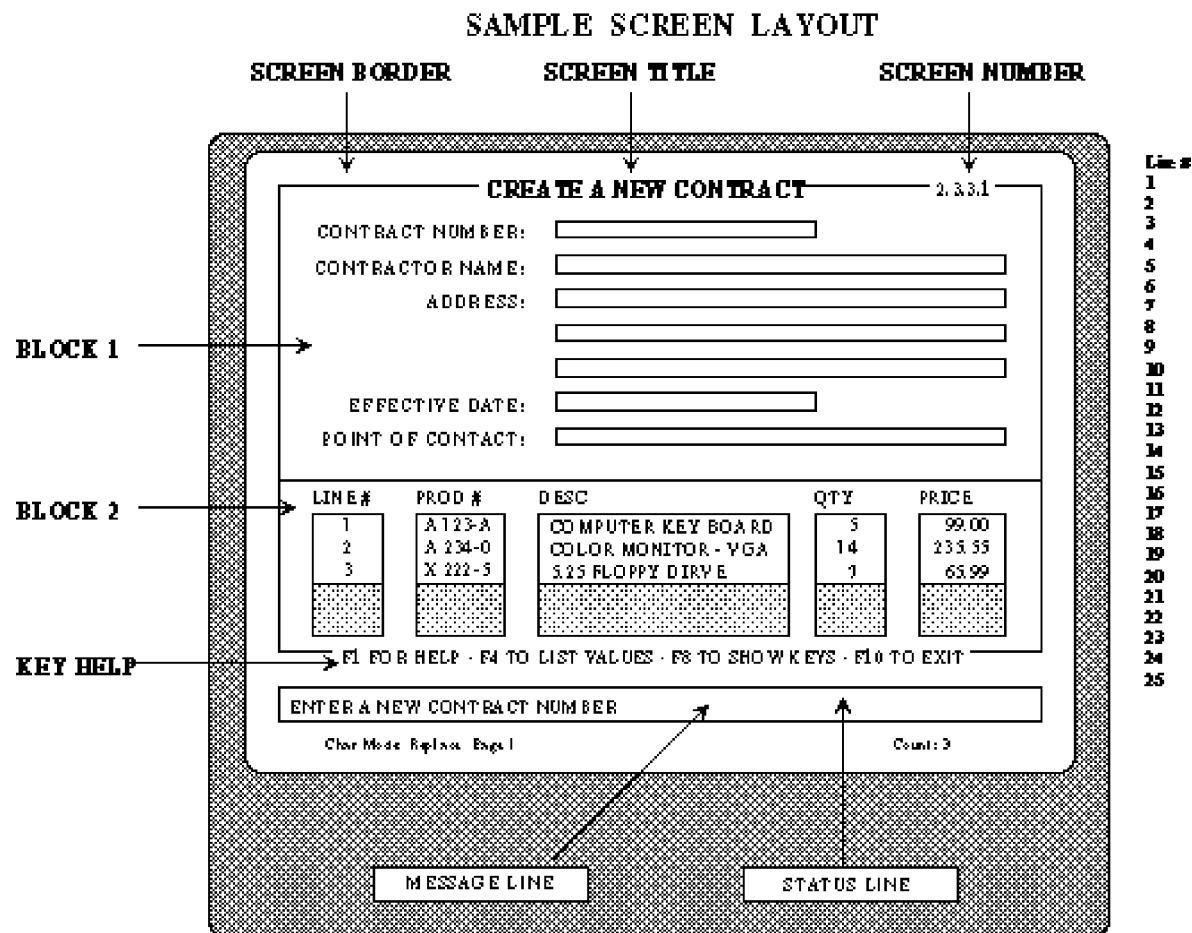


Figure 14-1. Sample Screen

## Appendix 14 - Transaction Design Standards and Conventions

The screen title line will begin on line 1 and continue to line 2, if required. A screen number will appear on the rightmost side of the title line. This number will be unique and consistently assigned within a business process. The data area on the screen will be enclosed with a graphic box beginning on line 1, column 1, and ending on line 20, column 80. A key help message will appear on line 20. This area will direct the user to some of the standardized keys that will be universal for all Corps systems. Line 21 is reserved for Oracle and application supplied messages. The last line, line 22, will be the Oracle Status (or Mode) line.

### Menus

Figure 14-2 shows a sample menu screen for *function selection* in a system. The entire menu should be boxed as explained above for screens, except for the function key help message. The selection should be made from a two digit numeric field. Designate the selection of '0' to exit the application. This will ensure that the user is not unintentionally dropped out of the application and into the operating system. Designate the selection of '1' to return to the previous menu selection which can also be accessed by the exit key.

### Function Keys

The standardization of certain basic function keys provides users with a familiar transaction environment across AIS.

## Appendix 14 - Transaction Design Standards and Conventions

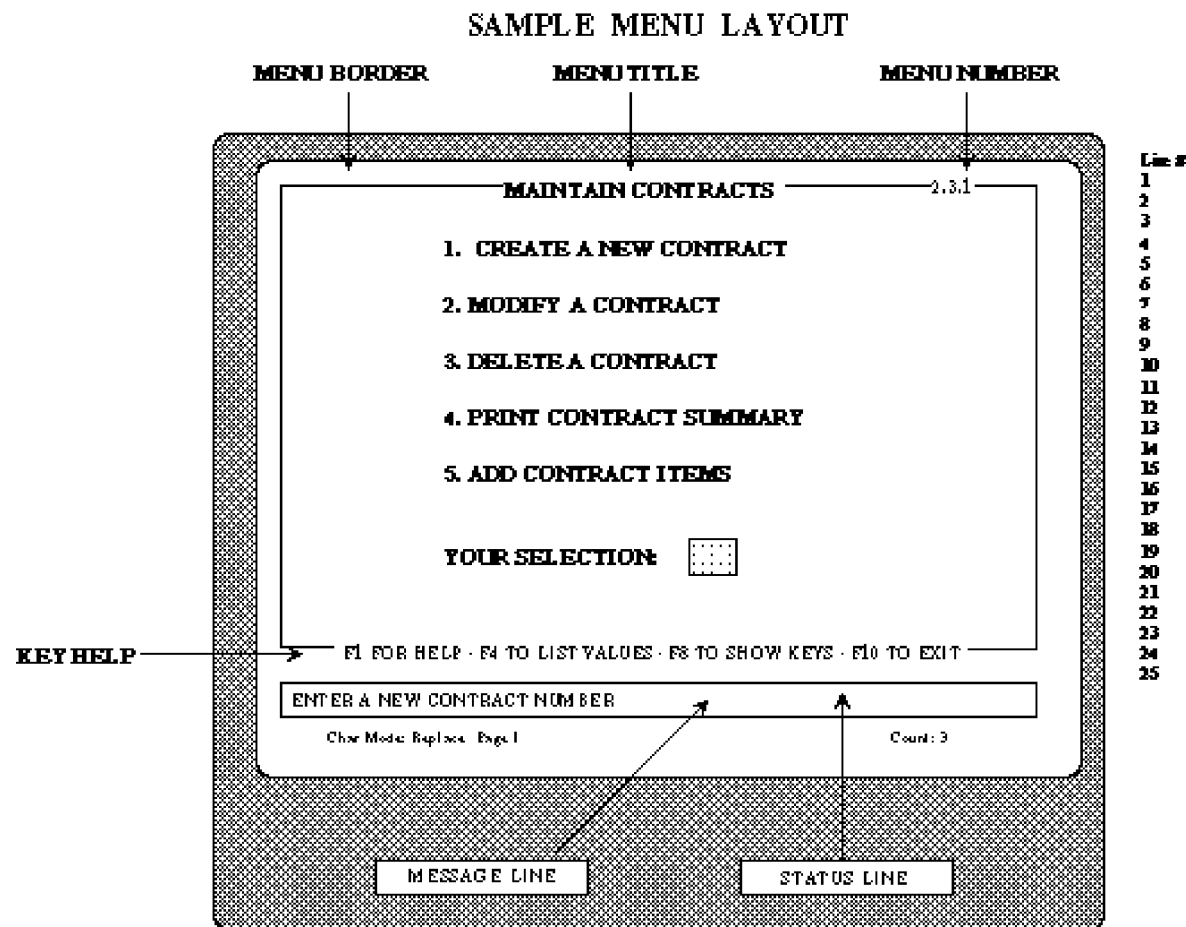


Figure 14-2. Sample Menu

## Appendix 14 - Transaction Design Standards and Conventions

Developers and support personnel also benefit from this consistency while developing modules and with communication with users during support. For example, in a PC-based Oracle installation, the Oracle applications SQL\*Forms and SQL\*Menu operate with a key-mapping scheme that is a standard for a PC computing environment. However, as stated in the SQL User Guides, Oracle restricts their documented references to function keys by *function* names, as opposed to *physical* names, since physical key mappings (the specific relationship between the physical keys on a keyboard and the functions they invoke in a specific application) will vary from system to system. A sample keyboard that illustrates a representative set of standard Oracle functions mapped to their related keys, using a common PC-based configuration, is depicted in Figure 14-3.

### Function Keys - CORP200 Emulator

The Corps has encountered problems with production application systems that have evolved over time in which inconsistent key mapping schemes associated with various terminal emulators are all too common. As a result of recent HQUSACE/IM studies in this area, the Corps now uses a standard terminal emulation, with common key mapping schemes, based on a customized version of the VT220 emulator. This new standard, known as the CORP220, is the option that is most compatible with ANSI standards, and will not require any major modifications to existing Corps AIS functionality.



## Appendix 14 - Transaction Design Standards and Conventions

### SAMPLE KEYBOARD WITH RELATED ORACLE FUNCTIONS (REPRESENTATIVE)\*

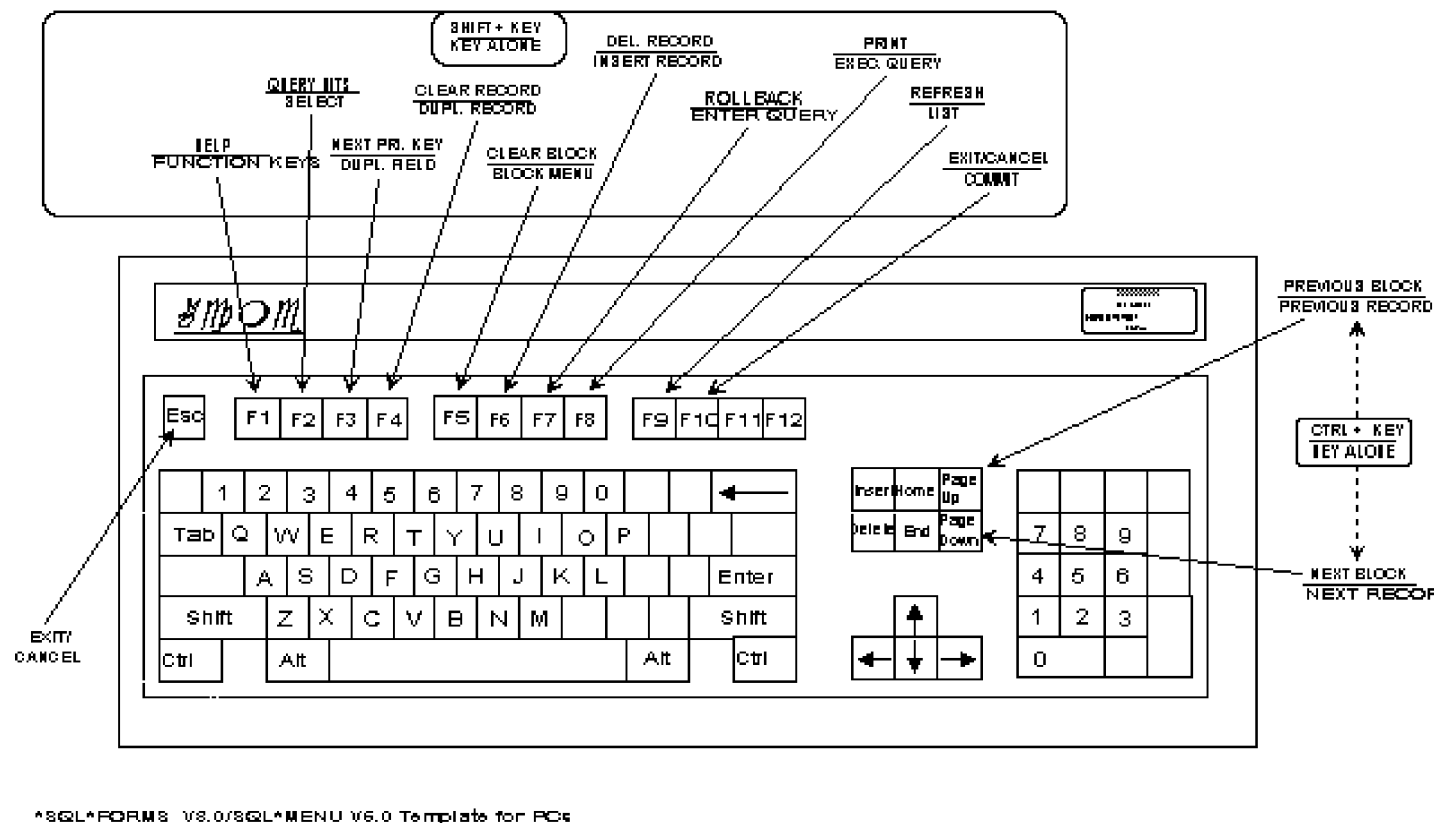


Figure 14-3. Sample Keyboard Layout

## Appendix 14 - Transaction Design Standards and Conventions

The CORP220 emulator functionally consists of two parts: (1) a corp220.emu file that is used on PC side, and (2) a corp220.crt or corp220.r file, depending on whether the user is in version 6 or version 7 of the Oracle database. For a clear understanding of how this is expected to work, the two components will be described according to where they are expected to function.

On the PC side, where the user is running communications software, the expectation is that the user is using Vistacom (for DOS). If this is correct, then the user should use the corp220.emu file as the emulator. If, however, the user is employing Vistacom (for Windows), then he/she should use the VT220 emulator. Vistacom for Windows has been tested and found to comply with the corp220. Other communication packages that provide VT220 emulation should also work but they have not all been tested. The functionality of the emulator on the PC side has no bearing on the version of the database used on the host side.

On the host side, one of two files is needed, depending on whether the database being accessed is pre-version 7 or version 7 of Oracle. For pre-version 7 databases, the file needed is corp220.crt and, for version 7 databases, the file needed is corp220.r. These files are normally handled by the system DBA and end users typically do not have to worry about which file it is or where it is located.

**Note:** There is a known discrepancy in the corp220.emu and VT220.emu. The F5 key that should perform a Clear Record does not work; the user must use Esc R instead.

# Appendix 14 - Transaction Design Standards and Conventions

The most current version of the CORP220 standard key mappings for Oracle SQL\*Forms, SQL\*Menu, and SQL\*Runform/Runmenu - - which represent both **design** and **user** views of the application -- are provided in Figures 14-4 through 14-6.

## Error Messages

Developer-programmed error messages resulting from validation checks and other responses, will not exceed 80 characters and will be displayed on the message line (line 21) of the screen being accessed by the user.

## Help Messages

Whenever a user is in a field, a form of help must be available. Autohelp for each enterable field should be enabled with a message containing context sensitive help. The <F1> function key will be used for extended help capability. Extended help is not required for menu selection.

## Future Extensions

Future extensions to the CORP 220 standards will follow industry conventions to the extent possible, consistent with overall Corps requirements.

### CORP 220/SQL\*FORMS KEYMAPPING (DESIGN MODE)

FUNCTION KEYS	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
------------------	----	----	----	----	----	----	----	----	----	-----

## Appendix 14 - Transaction Design Standards and Conventions

<b>Normal</b>	Select	Define Field	Draw Box & Line	Paste	Cut	Clear Field	Resize Field	Show Function Keys	Create Field	Exit/Cancel
<b>SHIFT</b>	Change Display Type	Screen Painter	Zoom Out	Zoom In	Cut	Prev. Page	Next Page	Redisplay Screen	Print	Undo
<b>CTRL</b>										
<b>ESCAPE</b>	Help	Search	Menu	List						

### CONTROL KEYS

A = Insert/Replace  
 B = Left  
 F = Right  
 K = Show Function Keys  
 N = Navigate  
 U = Undo  
 V = Select (also F1)  
 W = Redisplay Screen  
 X = Exit/Cancel (also F10)

### MISCELLANEOUS KEYS

Backspace = Delete Backwards  
 Del = Delete Char  
 End = Accept  
 Enter = Return  
 Esc B = Bookmark  
 Esc C = Copy Object  
 Esc H = Help  
 Esc U = Draw Box & Line  
 Esc Pg-Up = Prev. Page  
 Esc Pg-Dn = Next Page  
 Esc ? = List  
 Esc <-- = Begin of Line  
 Esc --> = End of Line  
 Esc Ins = Copy Object  
 Esc Return = Prev. Field  
 Esc Home = First Line  
 Esc End = Last Line  
 Esc Delete = Delete Line  
 Esc Esc Up Arrow = Scroll Up  
 Esc Esc Dn Arrow = Scroll Down  
 Esc Esc <-- = Scroll Left

### MISCELLANEOUS KEYS (Cont'd)

Esc Esc --> = Scroll Right  
 Esc Esc Ins = Copy  
 Esc \*D = Delete Record  
 Esc \*E = Previous Page  
 Esc \*F = Next Page  
 Esc \*G = Previous Record  
 Esc \*H = Next Record  
 Esc \*I = Zoom In  
 Esc \*M = Menu  
 Esc \*N = Navigate  
 Esc \*O = Zoom Out  
 Esc \*S = Search  
 Esc \*Y = Chg. Display Type  
 Esc \*Z = Screen Painter  
 Home = Select  
 Ins = Insert/Replace  
 Pg-Dn = Next Block  
 Pg-Up = Prev. Block  
 Return = Return  
 Shift-Tab = Prev. Field  
 Tab = Next Field

Figure 14-4. CORPS 220/SQL\*Forms Keymapping

## Appendix 14 - Transaction Design Standards and Conventions

### CORP 220/SQL\*MENU KEYMAPPING (DESIGN MODE)

FUNCTION KEYS	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
<b>Normal</b>	Help	Inter-Active OS Commands	Show Backgrnd Menu		Next Field	Clear Field		Prev. Field	Enter/Execute O/S Command	Exit/Cancel
<b>SHIFT</b>	Go To Main Menu	Go To Applic. Menu	Show Backgrnd Menu		Help			Redisplay Screen		Terminate Form Input
<b>CTRL</b>										
<b>ESCAPE</b>										

#### CONTROL KEYS

A = Insert/replace  
 B = First Line  
 D = Last Line  
 E = End of Line  
 F = Show Function Keys  
 G = Scroll Up  
 J = Scroll Down  
 K = Show Function Keys  
 L = Redisplay Screen  
 N = Scroll Left  
 O = Scroll Right  
 P = Delete Backwards  
 R = Redisplay Screen  
 T = Delete Line  
 U = Edit  
 V = Search  
 W = Select  
 X = Menu  
 Y = List  
 Z = Exit  
 Ctrl <-- = Beginning of Line  
 Ctrl --> = End of Line

#### MISCELLANEOUS KEYS

Backspace = Prev. Field  
 Del = Delete Char  
 Esc D = Change Debug Mode  
 Esc K = Show Function Keys  
 Esc U = Redefine User/Password  
 Esc W = Change Special Window  
 Esc \*1 = Backgrnd. Menu Opt. 1  
 Esc \*2 = Backgrnd. Menu Opt. 2  
 Esc \*3 = Backgrnd. Menu Opt. 3  
 Esc \*4 = Backgrnd. Menu Opt. 4  
 Esc \*5 = Backgrnd. Menu Opt. 5  
 Esc \*6 = Backgrnd. Menu Opt. 6  
 Esc \*7 = Backgrnd. Menu Opt. 7  
 Esc \*8 = Backgrnd. Menu Opt. 8  
 Esc \*9 = Backgrnd. Menu Opt. 9  
 Esc \*0 = Backgrnd. Menu Opt. 10  
 Esc \*A = Bookmark  
 Esc \*B = Copy Object

#### MISCELLANEOUS KEYS (Cont'd)

Esc \*C = Copy  
 Esc \*E = Change Display Type  
 Esc \*F = Zoom Out  
 Esc \*G = Zoom In  
 Esc \*H = Insert Record  
 Esc \*I = Delete Record  
 Esc \*J = Prev. Record  
 Esc \*L = Next Record  
 Esc \*M = Navigate  
 Esc \*P = Print  
 Esc \*V = Paste  
 Esc \*X = Cut  
 Home = Go to Main Menu  
 Ins = Insert/Replace  
 Pg-Up = Prev. Menu  
 Return = Return  
 Shift-Tab = Prev. Field  
 Tab = Next Field

Figure 14-5. CORPS 220/SQL\*Menu Keymapping

## Appendix 14 - Transaction Design Standards and Conventions

### CORP 220/SQL\*RUNFORM-RUNMENU KEYMAPPING (USER MODE)

FUNCTION KEYS	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
<b>Normal</b>	Help	Enter Query	Execute Query	List Field Values	Clear Record	Clear Field	Duplicate Record	Function Key Help	Create Record	Exit/Cancel
<b>SHIFT</b>	Count Query Hits	Next Set of Records	Commit Change	Delete Line	Delete Record	Clear Block	Duplicate Field	Redisplay Page	Print	Display Error
<b>CTRL</b>										
<b>ESCAPE</b>	Block Menu	Select	Search	Forms Menu			Copy	Applic. Menu	Prev. Menu	Main Menu

#### CONTROL KEYS

A = Insert/Replace  
 B = Begin of Line  
 D = Delete Char  
 E = End of Line  
 F = Duplicate Field  
 K = Next Primary Key  
 N = Next Record  
 O = Delete Line  
 P = Previous Record  
 R = Clear Record  
 U = Define User Password  
 V = Select  
 X = Exit (also F10/Cancel)  
 Y = Where Display  
 Z = Debug Mode  
 Ctrl <-- = Scroll left  
 Ctrl --> = Scroll right

#### MISCELLANEOUS KEYS

Backspace Delete = Delete backwards  
 Del = Delete Char  
 End = Accept/Commit  
 Enter = Return  
 Esc M = Enter Menu Params  
 Esc P = Enter Appl Params  
 Esc T = Show BGM  
 Esc Z = Debug Mode  
 Esc Up = Scroll Up  
 Esc Down = Scroll Down  
 Esc Tab = Prev Field  
 Esc Return = Prev Field  
 Esc --> = End of Line  
 Esc Delete = Cut  
 Esc Ins = Paste  
 Esc @ = Search  
 Esc Shift F10 = Enter >1 OS Command  
 Esc Shift F9 = Enter 1 OS Command  
 Esc \*# = Count Query Hits  
 Esc Pg Down = Last Line  
 Esc Pg Up = First Line  
 Esc \*1 = User Defined Keys  
 Esc \*2 = User Defined Keys  
 Esc \*3 = User Defined Keys

#### MISCELLANEOUS KEYS (Cont'd)

Esc \*4 = User Defined Keys  
 Esc \*5 = User Defined Keys  
 Esc \*6 = User Defined Keys  
 Esc \*7 = User Defined Keys  
 Esc \*8 = User Defined Keys  
 Esc \*9 = User Defined Keys  
 Esc \*0 = User Defined Keys  
 F1 1 = Backgrnd. Menu Opt. 1  
 F1 2 = Backgrnd. Menu Opt. 2  
 F1 3 = Backgrnd. Menu Opt. 3  
 F1 4 = Backgrnd. Menu Opt. 4  
 F1 5 = Backgrnd. Menu Opt. 5  
 F1 6 = Backgrnd. Menu Opt. 6  
 F1 7 = Backgrnd. Menu Opt. 7  
 F1 8 = Backgrnd. Menu Opt. 8  
 F1 9 = Backgrnd. Menu Opt. 9  
 F1 0 = Backgrnd. Menu Opt. 10  
 Home = Clear Form/Rollback  
 Ins = Insert/Replace  
 Kp\_Plus = Prev Block  
 Kp\_Minus = Next Block  
 Pg-Up = Prev Block  
 Pg-Dn = Next Block  
 Return = Return  
 Shift-Tab = Prev Field  
 Tab = Next field

Figure 14-6. CORPS 220/SQL\*\*Runform-Runmenu Keymapping

#### Guidelines for Application Development

It is essential that critical corporate AIS applications be effective, efficient, and "user friendly," Therefore, the following guidelines should

be followed in the development of AIS:

- € **Effective Design.** Effective design involves matching the applications code design to the anticipated deployment environment. If you are building a transaction processing system, you must be sensitive to the operational implications of certain design decisions. It may be more aesthetically pleasing to build your applications to edit and validate transaction data one field at a time, **but**, in a packet switching communications environment, this will generate significant costly, inefficient, and unnecessary communications traffic.

If you are, or will be, paying for the **volume** of packet traffic, it is more effective to do editing at the screen level, even if the entire screen must be transmitted more than once.

Alternatively, you might consider a modified "client/server" approach, downloading certain tables to the workstation and doing preliminary, "macro" editing at the local level.

Client/server imposes its own issues, including "synchronization" of local and host data.

In this process, as in all design considerations, **tradeoffs must be made and documented**. All design decisions are subject to being revisited at any later date if circumstances change, so it is important that the decisions be identified as to **WHY** things were done. Implementing major changes in the **WHY** category may involve substantial rewriting of existing applications code.

## Appendix 14 - Transaction Design Standards and Conventions

- € **Efficient Design.** Efficient design decision must consider effective use of both communications pathways and hardware/software cycles, such as impacts on the deployment environment. Does the AIS use the communications environment (LAN, WAN, CEAP, etc..) in an optimum manner? Does the AIS use the hardware/software environment efficiently? Should the database design be "normalized" or "de-normalized?" Should data/RDBMS tables be centralized, localized, or both? If major operational decisions change, this mixture could change also, with *significant* ramifications for the AIS. Should tables be indexed, de-indexed, or some of both? The developer should **document** all such decisions and **WHY** they were made. An impact analysis will be required if **ANY** major design decisions are changed.
  
- € **"User Friendly" Design.** User friendly design involves "consistency," and "ease of use." Consistency involves the AIS's "presentation," i.e., the way it appears to the user interfacing with the system and to the PDSS personnel maintaining the system. This consideration includes naming conventions -- for fields, screens, etc. "Ease of use" involves the way the AIS follows or supports the *physical* flow of work through the business process, as well as how well the AIS provides such conveniences as **on-line help** and **on-line tutorials**. In a modernized, integrated environment, design decisions made specifically for one AIS *will* impact other AIS.

At a minimum, the following conventions should be observed:



## Appendix 14 - Transaction Design Standards and Conventions

- € Once a name for a field has been identified on a screen, the same name and spelling should be used throughout the screens developed for the AIS.
- € Oracle transactions are executed through Oracle blocks which correspond to, at most, one database table. Graphically or physically differentiate between blocks on a screen. As an example, separating the boilerplate from a transaction. To eliminate a cluttered or busy screen, the screen should contain no more than three blocks.
- € Default values for fields should be displayed when the user enters the block.
- € File naming conventions should limit the file name size to the 8 character MS/DOS PC standard.
- € Line up fields on screens trying to match the beginning and/or ending of the fields.
- € Reverse video should be used to delineate field lengths.

### Appendix 14 - Topic Index

Design Standards A14-4

Function Keys - CORP200 Emulator A14-8

Guidelines for Application Development A14-15

Transaction Design Standards and Conventions - Introduction A14-1